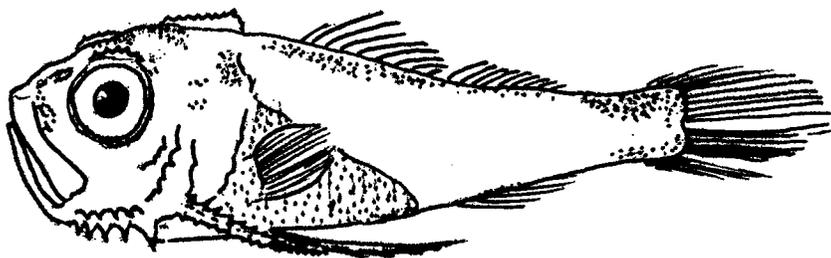




PRELIMINARY GUIDE TO THE IDENTIFICATION OF THE EARLY LIFE
HISTORY STAGES OF ACROPOMATID FISHES OF THE WESTERN CENTRAL
NORTH ATLANTIC

BY
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It will be a chapter entitled Acropomatidae in the "Guide to the early life history stages of fishes of the western central North Atlantic".

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Recognition of this family, previously included in the Percichthyidae (Gosline, 1966), follows Johnson (1984) and Heemstra (1986). Although there is no evidence supporting monophyly of this group, this systematic arrangement is more reasonable than recognizing a large Percichthyidae of unrelated genera (Johnson, 1984, 1993). The genera *Howella*, *Polyprion*, and *Symphysanodon*, provisionally placed within Acropomatidae by Nelson (1994), are recognized in this chapter in Howellidae, Polyprionidae, and Symphysanodontidae, respectively, following Fourmanoir (1981), Roberts (1993), and Nelson et al. (in press). The definition of the family Acropomatidae is still problematic. Recently, Heemstra & Yamanoue (2002) placed *Bathysphyraenops* and *Scombrops* within the Acropomatidae. However, Eschmeyer (2003) maintains *Bathysphyraenops* in Percichthyidae, and Gon (2002) provisionally placed it in Epigonidae. *Scombrops* is usually classed in its own family, Scombropidae (Johnson, 1986; Heemstra, 1986; Eschmeyer, 2003).

Adult acropomatids are benthopelagic fishes found on the edges and slopes of insular and continental shelves at depths from 36 to over 1000 m. Acropomatids have a dorsal fin completely separated into spinous and soft-rayed parts. The first part has 7-10 spines, and the second part with or without a spine and 8-10 soft rays; the anal fin has two or three spines and 7-9 soft rays; seven branchiostegal rays, and 25 vertebrae. Opercle with 2 spines;

large canine teeth on both jaws; lateral line not prolonged onto caudal fin.

There are six species of acropomatids within three genera (*Neoscombrops*, *Synagrops*, and *Verilus*) in the western central North Atlantic Ocean. Tables Acropomatidae 1, 2 and 3 present the geographic, and bathymetric distributions, common names, meristics, and morphometrics of the six species.

The eggs of acropomatid fishes are unknown. Descriptions of the early stage of acropomatids of the western central North Atlantic are practically non-existent. Only one figure of an 8.5 mm standard length *Synagrops* sp. larva has been published (Johnson, 1984). Similarly for the Pacific Ocean, brief descriptions of *Synagrops* sp. in Australia (Leis & Trnski, 1989), and *S. japonicus* in southern Japan (Konishi, 1988) are available, as well as a more detailed description of *S. philippinensis* (Gunther) in Kagoshima Bay, Japan (Haque & Ozawa, 1997).

Larvae of *Synagrops* spp. (2.0-16.5 mm NL-TL) have been collected in the Gulf of Mexico at 1-200 m during April-June and September-January (Southeast Area Monitoring and Assessment Program, SEAMAP). The abundance of these larvae appears to have two peaks of abundance in the localities sampled, the first peak occurred in May, and the second one in September (SEAMAP).

Synagrops larvae have an elongate and laterally compressed body; 25 myomeres; head with extensive spination, and gut heavily pigmented.

Spination of head is well developed; size of spines, and ornamentation differ among species. The supraoccipital crest, supraocular ridge, and preopercular spines appear between 2.7 and 3.2 mm NL. The last opercular spine is strong, serrate and longest of the opercular spines. The supraoccipital crest is conspicuous and has at least 9 spines. The head is large, about 35% NL in preflexion larvae, and 33% SL in postflexion larvae. The eye is relatively large, about 34% HL in preflexion larvae, and 31% HL in postflexion larvae. The mouth is large and almost vertical; maxilla reaches the middle point of pupil. Preflexion larvae lack tail pigmentation. Dorsal pigmentation of postflexion larvae begins on the nape, and continues on both sides of dorsal fin and upper caudal peduncle. A large gas bladder extends along most of the dorsal surface of the gut. The anus is located anterior to the posterior margin of the abdominal cavity and, in postflexion larvae, is closer to the origin of the pelvic fin than it is to the anal-fin origin. Villiform teeth are present on both jaws; characteristic large canine teeth not present on lower jaw at 14.2 mm. The gill membranes are free from the isthmus. Pectoral-fin rays start developing during flexion; complete pectoral fins are present at about 6.2 mm. The anterior edge of pelvic spines at about 7.2 mm is serrate in *S. spinosus* and smooth in *S. bellus*. The second spines of the dorsal and anal fins are serrate in *S. spinosus* at about 7.3 mm. Scales become visible at about 18.7 mm. Most of the head spination is lost in juvenile *S. bellus*; *S. spinosus* retain part of it.

The larvae of Symphysanodontidae and some Apogonidae are generally confused with acropomatids. *Symphysanodon* larvae have extremely long head spines; the spines extend over the dorsal fin. *Symphysanodon* larvae lack the supraoccipital crest spination of acropomatids, but have a pterotic ridge that is usually absent in acropomatids. Some apogonids have similar body shape, gas bladder, and supraoccipital crest, however, all of these apogonids have ventral pigmentation on the tail in preflexion larvae, lack serrations on the preopercular spines, and have a single conspicuous, not serrated, supraoccipital crest spine. Additionally, apogonids have the anus nearer the anal-fin origin than the pelvic-fin origin.

The following descriptions of the early life-stage of *S. spinosus* and *S. bellus* are based on 84 specimens collected by SEAMAP during 1990-1999 in the Gulf of Mexico. The specimens are deposited in the FWC-FMRI's Ichthyoplankton Archival Center, St. Petersburg, Florida. Identification followed descriptions of the adult stage (Mochizuki & Sano, 1984; Mochizuki & Gultneh, 1989; Cervigón, 1993; Mejia et al., 2001), and retrogressive developmental size-series of specimens. Meristic and morphometric data were obtained according to standard procedures (Hubbs & Lagler, 1949); measurements were made to the nearest 0.1 mm with an ocular micrometer. Measurements are expressed in mm and/or percentage of standard length (SL).

Table Acropomatidae 1. Geographic distribution, bathymetric distribution, and common names of the Acropomatidae found in the western central North Atlantic Ocean.

Species	Distribution		Common name	
	Geographic	Bathymetric (m.)	English	Spanish
<i>Neoscombrops atlanticus</i> Mochizuki & Sano, 1984	Caribbean Sea, off Dominican Republic, Nicaragua, Dominica, Colombia, and Puerto La Cruz, Venezuela.	180-650		párvulo
<i>Synagrops bellus</i> (Goode & Bean, 1896)	Bermuda, Canada, North Carolina to Florida, Gulf of Mexico, and Caribbean Sea to northern Argentina. Eastern Atlantic: off western Africa, from Guinea to Nigeria.	60 to over 1000	blackmouth bass	pardete boquinegro
<i>Synagrops pseudomicrolepis</i> Schultz 1940	Caribbean Sea, off Cuba, The Virgin Islands, Honduras, and Colombia to Surinam.	180-576		pardete escamitas
<i>Synagrops spinosus</i> Schultz, 1940	North Carolina to Florida, Gulf of Mexico, Caribbean Sea, off Isla Margarita, Venezuela, and Colombia to Suriname, and Brazil. Western Pacific: off Owase City, Japan, and near Hainan, China.	87-544	keelcheek bass	pardete zarzoso
<i>Synagrops trispinosus</i> Mochizuki & Sano, 1984	Northeastern Gulf of Mexico, Straits of Florida, Caribbean Sea, off Jamaica, Puerto Rico, The Virgin Islands, Nicaragua, Colombia, and Venezuela to Suriname, and Brazil.	36-550; at night can be found at surface.	threespine bass	pardete tres-espinas
<i>Verilus sordidus</i> Poey, 1860	Caribbean Sea, off Habana, Cuba, The Virgin Islands, Rosalind Bank, Honduras, and Isla Blanca, Venezuela.	120-329		berregüeyo

Table Acropomatidae 2. Meristics counts for the Acropomatidae of the western central North Atlantic Ocean. All species have I,5 pelvic fin rays, and 25 vertebrae (10 precaudal + 15 caudal). Lateral line = LL.

Character	Species					
	<i>N. atlanticus</i>	<i>S. bellus</i>	<i>S. pseudomicrolepis</i>	<i>S. spinosus</i>	<i>S. trispinosus</i>	<i>V. sordidus</i>
Dorsal fin	IX-I,10	IX,I,(8-9)	IX-I,(8-9)	IX-I,9	VIII-I,10	(IX-X)-I,10
Anal fin	III,7	II,(7-8)	II,(7-9)	II,(7-8)	III,(8-9)	III,7
Pectoral fin	15-16	15-17	15-16	15-17	16-17	14-15
Scales above LL to caudal fin base						42
Scales on LL to caudal fin base	44-48	28-31	31-38	29-31	46-51	50-51
Transverse scales above/below LL	(4-6)/(10-13)				(2.5-3.5)/(9-12)	
Gill rakers	(4-7)+1+(14-18)	(3-4)+1+(12-15)	(5-7)+1+(16-18)	(3-4)+1+(13-15)	(3-5)+1+11	(5-6)+(15-17)
Total gill rakers	19-22	16-20	23-26	17-20	15-17	20-22
Caudal fin principal rays	8+7	9+8		9+8	8+7	9+8
Predorsal bones	3				3	3
Branchiostegals	7	7	7	7	7	7
Teeth on lower jaw	20-40	4 -8 + very small		4 -8 + very small	4 + very small	2 + villiform

Table Acropomatidae 3. Morphometric measurements for the Acropomatidae of the western central North Atlantic Ocean. Measurements are expressed in mm, and percentage of standard length (SL) or percentage of head length (HL), unless otherwise specified.

Character	Species					
	<i>N. atlanticus</i>	<i>S. bellus</i>	<i>S. pseudomicrolepis</i>	<i>S. spinosus</i>	<i>S. trispinosus</i>	<i>V. sordidus</i>
Maximum size	134	307	130 TL	130 TL	150	300; 455 TL
SL range for morphometrics	112-240	40.3-205	53.9-145	40-109.4	40-115	296-300
% SL						
Head length	2.5-2.7	32.1-36.4	37.6-45.1	32.6-39.8	34.2-38.5	36.5-40.1
Body depth	2.9-3.3	22.5-29.7	29-36	24.6-32.5	22.9-27.8	34.1-39.5
Body width	5.6-7.8	9.7-16.8	14.5-20.4	9.8-15.6	6.77-14.6	
Predorsal length		33.4-39.6	34.9-43.4	35-41	37.8-40.6	41.4-43.5
Snout to origin of first dorsal	2.3-2.6	59.6-64.3	60.6-67.0	61.1-66.9	63.1-66.7	43.5
Snout to end of first dorsal		53.7-58.0	54.4-65.7	54.9-61.8	53.1-56.9	66.8
Snout to end of second dorsal	1.1-1.2	42.8-79.5	79.5-87.9	76.1-80.6	79-84.8	
Prepectoral fin length	2.3-2.7	32.3-37.6	36.6-49.3	33.7-40.4	34.9-39.6	36.4
Prepelvic fin length	2.1-2.4	32.9-41.5	41.7-52.1	35.9-47.3	35.3-43.5	41.2
Preanal fin length		63.2-70.6	67-75.3	62.7-71.9	63.2-71.1	71.6
Pectoral fin length	3-3.5			26.2-27.5	27.9-28.4	31.7
Pelvic fin spine length	6.2-7.7			15-15.9	10.6-11.1	22.1
Snout to pectoral fin insertion					2.44-2.82	36.4
Snout to pelvic fin insertion					1.15-1.25	41.2
Snout to vent length					1.44-1.66	
% HL						
Snout length	7.8-10.3 SL	18.9-28.3	22.3-29.8	19.7-27.3	25.7-32.7	9.2 SL
Eye diameter	6.7-7.8 SL	28.3-36.5	30.9-37.8	28.5-37.7	28-32.5	12.9 SL
Interorbital space	10.7-12.4 SL	25.6-31.6	20.5428.2	23.5-33.7	22.7-26.7	7.8 SL
Upper jaw length	4.9-5.6 SL	40.1-47	43.9-52.6	43.5-51.6	45.2-49.7	16.7-18.4 SL
Caudal peduncle depth	7.7-10.2 SL	23-31.5	20.3-28.7	23.7-36.5	23.4-27.3	14.7 SL
Caudal peduncle length		59.5-82.5	36.4-53.4	57.6-74.7	52.2-61	

MERISTICS

Vertebrae	
Precaudal	10
Caudal	15
Total	25
Number of fin spines and rays	
Dorsal	IX,I,(8-9)
Anal	II,(7-8)
Pectoral	15-17
Pelvic	I,5
Caudal	9+8
Gill rakers on first arch	
Upper	(3-4)+1
Lower	11-14
Total	15-19
Branchiostegals	7

LIFE HISTORY

Range: Western central North Atlantic: Bermuda, Canada, North Carolina to Florida, Gulf of Mexico, & Caribbean Sea to northern Argentina. Eastern Atlantic: off western Africa, from Guinea to Nigeria.

Habitat: Edges & slopes of insular & continental shelves at depths from 60 to over 1000 m.

ELH pattern: Oviparous, planktonic larvae at depths from 1 to at least 200 m.

Spawning season: April-June & September-January.

Spawning area: U.S. Gulf of Mexico.

Mode: Planktonic eggs and larvae.

Biology of this species is little known.

Note: Mochizuki & Gultneh (1989) and Mochizuki (2002) suggested that *S. bellus* and *S. japonicus* (Doderlein, 1883) might be conspecific in spite of allopatry.

LITERATURE

Cervigón 1993, Goode & Bean 1896, Meija et al. 2001, Mochizuki 2002, Mochizuki & Gultneh 1989.

EARLY LIFE HISTORY

EGGS: Unknown.

LARVAE: Body elongated and laterally compressed. Head length about 35% NL in preflexion larvae, & 33% in postflexion larvae. Eyes relatively large, about 34% HL in preflexion larvae, & 31% HL in postflexion larvae. Mouth large, almost vertical; maxilla reaches middle point of pupil. Villiform teeth; large canine teeth on upper & lower jaw not developed at 16.5 mm.

Length at flexion: Flexion starts at about 3.4 mm & is complete at about 4.2 mm.

Sequence of fin development: C, D₁, D₂, A & P₂ almost concurrently, & P₁. Fin rays are complete at about 8.0 mm.

Pigmentation: Preflexion larvae have melanophores on forehead, nape, & gut; postflexion larvae have pigmentation on forehead, nape, internal side of opercle, along D fin base, caudal peduncle, & gut.

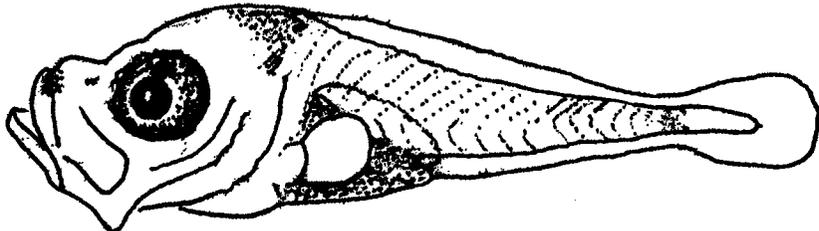
Head spination: Small to well developed spines on preopercle, subopercle, opercle, supraoccipital crest, supraocular ridge, & maxillary.

Diagnostic characters: At about 4.5 mm, head spination less pronounced than in *S. spinosus*. At about 5.5-6.1 mm, dorsal pigmentation at base of D₂ & caudal peduncle lighter than in *S. spinosus*. From about 7.2 mm, anterior edge of spines of P₂, D₁, & A fins smooth; A II,7-8, usually 7 rays.

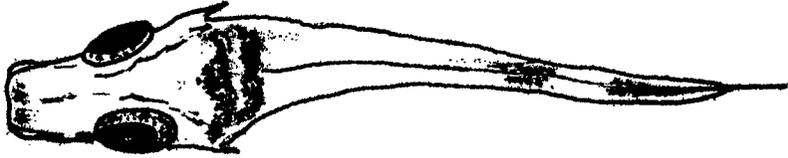
JUVENILES: Similar to adults.

ILLUSTRATIONS

All original by R. Ruiz-Carus: A) Preflexion *Synagrops* sp. 2.7 mm NL, B) Dorsal view of preflexion *Synagrops* sp. 2.7 mm NL, C) Postflexion *S. bellus* 6.0 mm, & D) Postflexion *S. bellus* 7.7 mm.



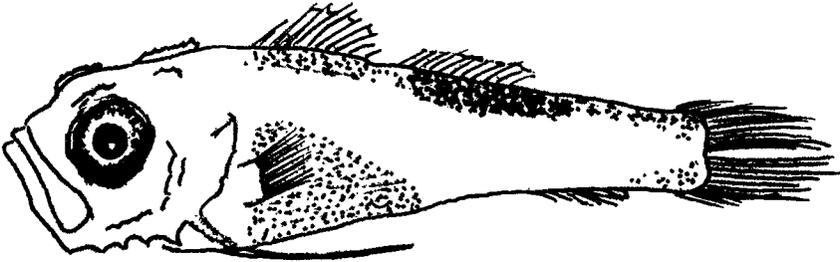
A



B



C



D

MERISTICS

Vertebrae	
Precaudal	10
Caudal	15
Total	25
Number of fin spines and rays	
Dorsal	IX-I,9
Anal	II,(7-8)
Pectoral	15-17
Pelvic	I,5
Caudal	9+8
Gill rakers on first arch	
Upper	(3-4)+1
Lower	13-15
Total	17-20
Branchiostegals	7

LIFE HISTORY

Range: Western central North Atlantic: North Carolina to Florida, Gulf of Mexico, & Caribbean Sea, off Isla Margarita, Venezuela, & Colombia to Suriname, & Brazil. Western Pacific: off Owase City, Japan, & near Hainan, China.

Habitat: Edges & slopes of insular & continental shelves at depths from 87 to 544 m.

ELH pattern: Oviparous, planktonic larvae at depths from 1 to at least 200 m.

Spawning season: April-June & September-January.

Spawning area: U.S. Gulf of Mexico.

Mode: Planktonic eggs and larvae.

Biology of this species is little known.

LITERATURE

Cervigón 1993, Johnson 1984, Mochizuki 1989, Meija et al. 2001

EARLY LIFE HISTORY**DESCRIPTION**

EGGS: Unknown.

LARVAE: Body elongated & laterally compressed. Head length about 35% NL in preflexion larvae, & 33% in postflexion larvae. Eyes relatively large, about 34% HL in preflexion larvae, & 31% HL in postflexion larvae. Mouth large, almost vertical; maxilla reaches middle point of pupil. Villiform teeth; large canine teeth on upper & lower jaw not developed at 14.2 mm.

Length at flexion: Flexion starts at about 3.5 mm & is complete at about 4.5 mm.

Sequence of fin development: C, D₁, D₂, A & P₂ almost concurrently, and P₁. Fin rays complete at about 8.0 mm.

Pigmentation: Preflexion larvae have melanophores on forehead, nape, & gut; postflexion larvae have pigmentation on forehead, nape, tip of snout, along D base, caudal peduncle, & gut.

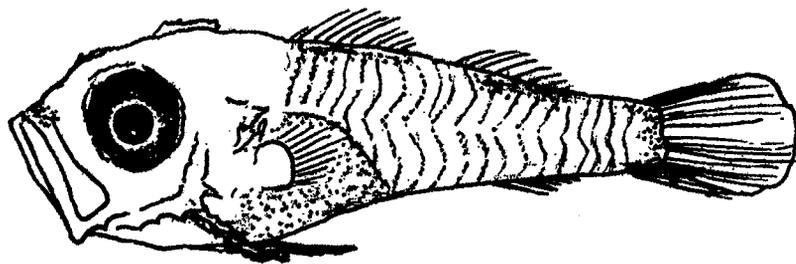
Head spination: Small to well developed spines on preopercle, subopercle, opercle, supraoccipital crest, supraocular ridge, & maxillary.

Diagnostic characters: At about 4.5 mm, head spination more pronounced than in *S. bellus*. At about 5.5-6.1 mm, dorsal pigmentation is darker at base of D₂ and caudal peduncle than in *S. bellus*. From about 7.2 mm, anterior edge of pelvic spines, & second spines of D₁ & A are all serrated.

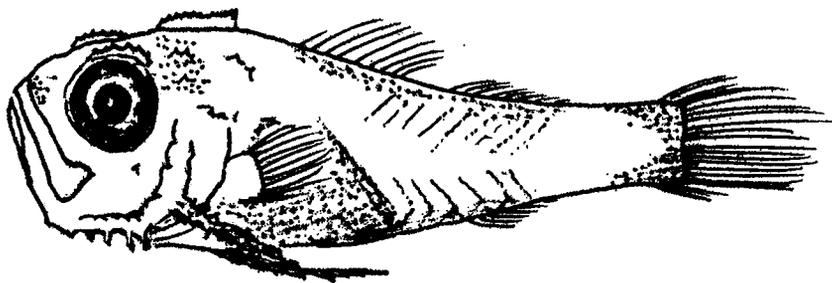
JUVENILES: Similar to adults.

ILLUSTRATIONS (Illustrator)

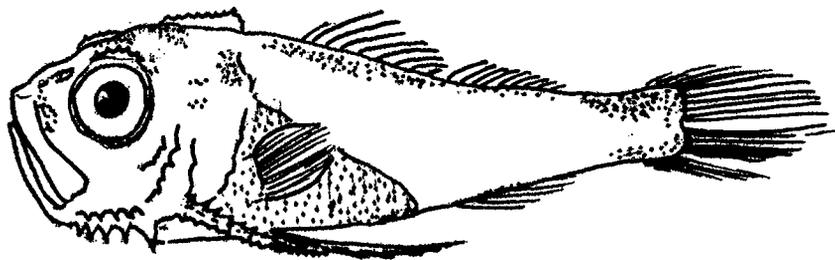
A-C) Original by R. Ruiz-Carus: A) Postflexion *S. spinosus* 6.0 mm, B) Postflexion *S. spinosus* 7.2 mm, C) Postflexion *S. spinosus* 8.1 mm, D) Postflexion *Synagrops* sp. 8.5 mm from Johnson 1984: fig. 254B.



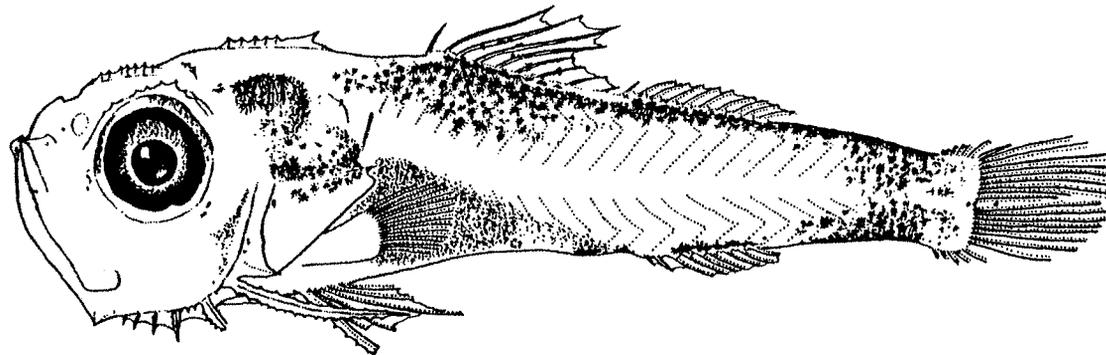
A



B



C



D

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